

Patent claims

1. Thermoplastic polymeric materials with high IR absorption, containing at least one inorganic metal phosphate of the general formula $\text{Me}_x(\text{PO}_4)_y(\text{OH})_z$, wherein Me consists of one or more elements from the group Cu, Fe, Mn, Sb, Zn, Ti, Ni, Co, V, Mg, Bi, Be, Al, Ce, Ba, Sr, Na, K, Ge, Ga, Ca, Cr, In or Sn, and wherein x and y are whole numbers and $x = (1 \dots 18)$, $y = (1 \dots 12)$ and $z = (0.2 \dots 10)$, and the inorganic metal phosphate may optionally also contain water of crystallisation.
2. Thermoplastic polymeric materials according to Claim 1, characterised in that they contain one or more of the plastics polyesters, polyalkylenes, vinyl polymers, polyamides, polyacetals, polyacrylates, polycarbonates, polystyrenes, polyurethanes, acrylonitrile-butadienestyrene copolymers (ABS), halogenated polyalkylenes, polyarylene oxides or polyarylene sulfides.
3. Thermoplastic polymeric materials according to Claim 2, characterised in that they contain one or more of the plastics polyethylene - terephthalate (PET), polytrimethylene terephthalate (PTT), polybutylene terephthalate (PBT), polyethylene naphthalate (PEN), polyethylene (PE), zPolypropylene (PP), polyvinyl chloride (PVC) or polymethyl methacrylate (PMMA).
4. Thermoplastic polymeric materials according to one of Claims 1 to 3, characterised in that the following are satisfied for the general formula $\text{Me}_x(\text{PO}_4)_y(\text{OH})_z$: $x = (1 \dots 5)$, $y = (1 \dots 4)$ and $z = (0.2 \dots 5)$.
5. Thermoplastic polymeric materials according to one of Claims 1 to 4, characterised in that the following are used as inorganic metal phosphates with the general formula $\text{Me}_x(\text{PO}_4)_y(\text{OH})_z$:
 $\text{Cu}_2\text{PO}_4\text{OH}$, $\text{Cu}_3(\text{PO}_4)(\text{OH})_3$, $\text{Cu}_3(\text{PO}_4)(\text{OH})_3$, $\text{Cu}_5(\text{PO}_4)_2(\text{OH})_4$,

5 $\text{CuFe}_2(\text{PO}_4)_2(\text{OH})_2$, $(\text{Cu,Zn})_2\text{ZnPO}_4(\text{OH})_3 \cdot 2(\text{H}_2\text{O})$,
 $(\text{Cu,Zn})_5\text{Zn}(\text{PO}_4)_2(\text{OH})_6 \cdot (\text{H}_2\text{O})$, $\text{Cu}_3\text{Al}_4(\text{PO}_4)_3(\text{OH})_9 \cdot 4(\text{H}_2\text{O})$,
 $\text{CuAl}_3(\text{PO}_4)_4(\text{OH})_3 \cdot 4(\text{H}_2\text{O})$, $(\text{Zn,Cu})\text{Al}_6(\text{PO}_4)_4(\text{OH})_8 \cdot 4(\text{H}_2\text{O})$,
 $\text{CuFe}_6(\text{PO}_4)_4(\text{OH})_8 \cdot 4(\text{H}_2\text{O})$, $\text{CaCu}_6[(\text{PO}_4)_2(\text{PO}_3\text{OH})(\text{OH})_6] \cdot 3(\text{H}_2\text{O})$ or
 $\text{Cu}_2\text{Mg}_2(\text{PO}_4)_2(\text{OH})_2 \cdot 5(\text{H}_2\text{O})$.

6. Thermoplastic polymeric materials according to one of Claims 1 to 4, characterised in that the amount of inorganic metal phosphates added is from 0.0002 to 2 wt.%, expressed in terms of the final thermoplastic polymeric material.
- 10 7. Thermoplastic polymeric materials according to one of Claims 1 to 6, characterised in that the amount of inorganic metal phosphates added is from 0.001 to 0.1 wt.%, expressed in terms of the final thermoplastic polymeric material.
- 15 8. Thermoplastic polymeric materials according to one of Claims 1 to 7, characterised in that the inorganic metal phosphate has Scherrer crystallite sizes of from 0.005 to 5 μm .
9. Thermoplastic polymeric materials according to one of Claims 1 to 8, characterised in that the inorganic metal phosphate has Scherrer crystallite sizes of from 0.001 to 2 μm .
- 20 10. Method for the preparation of thermoplastic polymeric materials with high IR absorption, containing at least one inorganic metal phosphate of the general formula $\text{Me}_x(\text{PO}_4)_y(\text{OH})_z$, characterised in that solutions of the relevant metal ion, or the relevant metal ions, and a solution of the relevant PO_4 component in an aqueous medium are precipitated,
- 25 the product obtained is dried and incorporated into a thermoplastic polymeric material.

11. Method according to Claim 10, characterised in that corresponding solutions of the sulfates, chlorides, nitrates, hydroxides or oxides are used as the metal ion solution.
- 5 12. Method according to Claim 10 or 11, characterised in that phosphoric acid or solutions of its soluble salts, such as alkali metal or alkaline-earth metal phosphates, are used as the solution for the PO_4 component.
- 10 13. Method according to one of Claims 10 to 12, characterised in that the precipitation products are hydrothermally treated and/or heat treated in the dry state in order to form the desired metal phosphate.
14. Use of the thermoplastic polymeric materials described in Claims 1 to 9 in methods in which thermoplastic polymeric materials are softened by heating with IR radiation and subsequently subjected to further processing to shape them.
- 15 15. Use of the thermoplastic polymeric materials described in Claims 1 to 9 in the production of preforms, which are heated by means of IR radiation and subsequently processed to form consumer articles and packaging.